# SOLAR IMPLEMENTATION GUIDE FOR CITIES

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## INTRODUCTION

The goal of the Solar America Initiative is to make energy from solar photovoltaics cost competitive with conventional electric power by 2015. Policymakers play a key role in reaching that goal and creating a sustainable environment for the solar industry. The objective of this document is to serve as a guide or template for Solar America Cities to create a comprehensive, city-wide solar plan for their community that facilitates mainstream adoption of solar and serves as a model for other cities to follow.

This guide is broken into discrete areas that the Department of Energy (DOE) has determined to be important components in the constitution of a sustainable solar infrastructure. This guide is a work in progress, and will go through revisions and improvements over the next few years as cities and DOE discover new strategies for mainstreaming solar energy.

Each of the sections in this plan is organized in the following manner:

- **Description**: A short description of the incentive, policy, or guideline
- **Providers**: Best positioned entities to act upon or provide this incentive or policy
- **Best Practices**: Describes how different cities and states have actually implemented these policies and incentives to stimulate the marketplace

## RULES, REGULATIONS, AND POLICIES

### Net Metering & Interconnection Policies

*Description*

For customers who generate their own electricity, *net metering* allows for the flow of electricity both to and from the customer, typically through a single, bi-directional meter. With net metering, during times when a customer's generation exceeds the customer's use, electricity from the customer flows back to the grid, offsetting electricity consumed by the customer at a different time. In effect, the customer uses excess generation to offset electricity that the customer otherwise would have to purchase from the utility at the utility's retail rate. Net metering is required by state law or regulations in 42 U.S. states and the District of Columbia, although some of these laws and regulations only apply to investor-owned utilities. Several utilities – mostly municipal utilities – offer net metering voluntarily. There is no federal net-metering requirement, and there has been little federal guidance on this issue.

The term *interconnection* refers to the technical and procedural process by which a customer connects an electric-generating system to the power grid. In general, interconnection standards specify the technical, contractual, metering and rate issues by which system owners and utilities must abide.

The Public Utility Regulatory Policies Act of 1978 (PURPA) requires investor-owned utilities and certain other utilities with annual retail sales of at least 500 million kilowatt-hours (kWh) to interconnect with customer-generators, but this law has not been fully effective at the state level. The Federal Energy Regulatory Commission (FERC) has adopted interconnection standards for generators up to 20 megawatts (MW) in capacity, but these standards generally apply only to transmission-level interconnection.

*Providers*

Usually states implement net-metering rules; however, cities with municipal utilities may also implement net-metering rules.

Interconnection standards for distribution-level interconnection are generally set forth at the state level, although standards adopted by many states apply only to investor-owned utilities. Some municipal utilities have developed their own interconnection standards for net-metered systems.

*Best Practices and Examples*

The most successful net-metering rules and programs include the following provisions:

- The maximum individual system capacity should be at least 2 MW.
- All utilities – including municipal utilities and electric cooperatives – should be required to offer net metering.
- All customer classes should be eligible.
- The limit on the aggregate capacity of all net-metered systems in a utility's service territory should be at least 5% of the utility's annual peak load.
- Any customer net excess generation (NEG) at the end of a billing cycle should be credited to the customer's next bill at the utility's full retail rate until the customer leaves the utility's system. Alternatively, a utility should compensate the customer for NEG at the utility's avoided-cost rate at the end of a 12-month period.
- Fair, safe and reasonable interconnection standards should be adopted for net-metered systems.
- Utilities should not be permitted to impose application fees on prospective net-metering customers.
- Utilities should not be permitted to impose any special charges or fees for net-metering customers, or force customers to switch to a different tariff.
- Customers should retain ownership of all renewable-energy credits (RECs) associated with the customer's generation.

New Jersey's net-metering rules are widely considered to be the best in the United States. New Jersey's rules incorporate most of the best practices listed above, with one notable exception – the rules only apply to investor-owned electric utilities and not to municipal utilities or electric cooperatives.[1] In combination with an aggressive Renewables Portfolio Standard (RPS) and solar set-aside, generous financial incentives, excellent interconnection standards and a favorable regulatory climate, New Jersey's net-metering rules have led to the deployment of more than 2,000 photovoltaic (PV) systems since 2004. Colorado's rules and Maryland's rules are very similar to New Jersey's.

Of the dozen or so municipal utilities that offer net metering, Lakeland Electric has adopted one of the most pro-solar programs. Lakeland Electric allows commercial PV systems up to 500 kilowatts (kW) in capacity to net meter, while most other municipal utilities that offer net metering voluntarily limit individual systems to 10 kW.[2] A handful of electric cooperatives voluntarily offer net metering; these programs are typically limited to systems with a 10-kW maximum capacity.

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1 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=NJ03R&state=NJ&CurrentPageID=1

2 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=FL15R&state=FL&CurrentPageID=1&RE=1&EE=0

Map of net metering availability:
http://www.dsireusa.org/documents/SummaryMaps/NetMetering_Map.ppt

The most successful state-level interconnection standards include the following provisions:

- The maximum individual system capacity should be at least 10 MW.
- Standards should include three or four separate levels of review to accommodate systems based on system capacity, complexity and level of certification. Small, certified systems should be processed as quickly as possible, while larger, uncertified systems should require closer review. Larger systems that do not export electricity should require a less rigorous review process than larger systems that do export electricity.
- Application costs should be kept to a minimum, particularly for smaller systems.
- Reasonable, punctual procedural timelines should be adopted and enforced.
- A standard form agreement should be used.
- An external disconnect switch should not be required.
- Clear, transparent technical screens should be established.
- Interconnection to area networks should be permitted, with reasonable limitations where appropriate.
- Utilities should not be permitted to require customers to purchase liability insurance.
- Utilities should not be permitted to require customers to indemnify utilities, absent a reciprocal provision.

Roughly two dozen states have adopted interconnection standards for distributed generation. Colorado's interconnection standards, which are similar to the federal interconnection standards set forth in FERC Order 2006, incorporate most of the provisions listed above. New Jersey's interconnection standards also are among the best in the United States, although New Jersey's standards only apply to systems with a maximum capacity of 2 MW. At the local level, few municipal utilities and electric cooperatives have voluntarily developed guidelines for interconnection. (Notable exceptions are those municipal utilities and electric cooperatives that have voluntarily developed guidelines for net metering.)[3]

For more detailed information about interconnection and net metering issues, please refer to the Connecting to the Grid guide, published by the North Carolina Solar Center and the Interstate Renewable Energy Council (http://www.dsireusa.org/documents/PolicyPublications/IC_Guide.pdf).

[3] http://www.dsireusa.org/library/includes/type.cfm?EE=1&RE=1

## Public Benefits Funds

*Description*

Public benefits funds (sometimes referred to as clean energy funds) are typically state-level programs developed to assure continued support for renewable energy, energy efficiency, and low-income programs. Several such funds were established through the electric utility restructuring processes of the late 1990s.

*Providers*

States generally provide public benefits funds by means of taxing ratepayers a small amount in their utility bill.

*Best Practices and Examples*

Most of the 17 existing state public benefits funds are supported through a surcharge on utility customer electricity consumption (e.g., 0.2 cents/kWh) but have also been established as a result of utility merger settlements. Renewable energy funds are used to provide direct incentives and financing for renewable energy projects, business development activities, research and development, and education programs. These funds have been instrumental in spurring the growth of solar markets in recent years.

Municipalities that have authority over their local utilities may also consider establishing funds via a dedicated surcharge or flat monthly fee to support solar programs. Municipal utilities in California, for example, have been administering solar programs supported by public benefits funds as directed by state policy for a number of years. Lakeland Electric, a municipal utility in Florida, recently authorized a flat $0.25/month public benefits charge for all customers to support its solar water heating and conservation programs.[4]

Map of states with public benefits funds for renewable energy:
http://www.dsireusa.org/documents/SummaryMaps/PBF_Map.ppt

## Solar Access Laws

*Description*

Solar access laws are designed to protect a consumer's right to install and operate solar energy systems on a home or business, including access to sunlight (also referred to as solar access).

[4] www.ases.org/solar2007/presentations/wednesday/200pm/forums/3-solar_thermal/3-curry.pdf

*Providers*

Typically states pass legislation related to solar access laws; however, local governments can pass ordinances that may effectively have the same result.

*Best Practices and Examples*

About a dozen states have passed laws that limit or prohibit restrictions that neighborhood covenants and/or local ordinances can impose on the use of solar equipment. For example, Arizona law protects property rights to solar access by dissolving any local covenant, restriction, or condition attached to a property deed, contract, or security agreement that restricts the installation or use of solar energy devices; however, property deeds, contracts, or security agreements that were entered into prior to April 17, 1980 are exempt.[5]

Some of the key elements to include in solar access laws include providing a clear and quantifiable standard for what constitutes an unreasonable restriction on solar energy systems (i.e., changes for aesthetic reasons cannot increase installation costs by more than 10%); defining the types of structures (residential, commercial, etc.) covered by the law; and awarding costs and reasonable attorney fees to the prevailing party in any civil action arising from disputes with homeowners associations.

An even more common type of solar access law at the state level is the solar easement. Easements allow for the rights to existing access to solar energy on the part of one property owner to be secured from an owner whose property could be developed in such a way as to restrict that resource. This easement is transferred with the property title. While this approach offers some protection for consumers, the policy does not address potential barriers imposed by local governments or homeowner associations. California's Solar Rights Act and Solar Shade Control Act combine elements of solar easements and protections against government and neighborhood restrictions.

At the local level, communities use a variety of different mechanisms to protect solar access, including solar access ordinances, development guidelines requiring proper street orientation, and zoning ordinances that contain building height restrictions to avoid shading neighboring solar panels.

[5] http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/33/00439.htm&Title=33&DocType=ARS

## Building Energy Standards that Mandate Solar Use

*Description*

Regulations may be passed at the state and local level requiring building standards that exceed national code and meet more aggressive energy efficiency standards such as those contained in IECC 2006 and ASHRAE 90.1 2006. If allowable by the state, cities may choose to go one step further and incorporate solar energy mandates into local building codes and standards.

Maps and overviews of the status of commercial and residential state energy codes can be found at: http://www.bcap-energy.org/map_page.php

*Providers*

State, city, and county governments may have the authority to require such standards.

*Best Practices and Examples*

Municipalities and state governments can play a critical role in supporting renewable energy by buying electricity from renewable resources, developing solar and green building design standards, or committing to installing a specified level of solar capacity on public buildings. About 10 states and dozens of cities require that a certain percentage of electricity purchased for government buildings come from renewable resources. In these cases, solar energy is not typically a big part of the renewable electricity mix.

Solar energy systems can be used to help meet green building certification requirements. Although a handful of states specifically target solar installations, these policies generally only require "consideration" of solar. In general, policies that merely encourage integrating solar into new buildings when feasible or that require consideration of solar on public buildings is not as effective as specific capacity or investment requirements.

Oregon, for example, requires that all new state public building projects and major renovations invest in solar technologies at a level of at least 1.5% of the total contract price.[6] California's statute calling for solar energy equipment to be installed on all state buildings and state parking facilities by 2007, where feasible, as well as a more recent *Green Building Initiative* to reduce grid-based energy use by 20% at major state-owned facilities, has led to the development of four megawatts of solar capacity on state buildings.[7] As a local example, San Francisco established a solar-specific capacity objective of 50 MW on public buildings by 2012 and has a bond revenue mechanism in place to help finance those projects.

[6] http://www.newrules.org/electricity/solaror.html, http://www.energy.ca.gov/greenbuilding/index.html
[7] http://www.newrules.org/electricity/solarca.html

## Solar Set-Asides in Renewables Portfolio Standards Policies

*Description*

Renewables Portfolio Standards (RPS) require that a certain percentage of a utility's retail energy sales or new generating capacity be derived from renewable resources, e.g., 10% of electric sales must be from renewable energy by the year 2020. The state or municipality implementing an RPS may choose to require a certain percentage of the RPS to be met specifically with solar energy.

*Providers*

Because states typically implement RPS policies, cities should work with the states in which they reside to encourage them to adopt such policies. Municipalities that have authority over their local utilities may also choose to adopt RPS policies to promote renewable energy development.

*Best Practices and Examples*

More than two dozen states have implemented such renewable generation mandates. Although wind and biomass are the predominant resources used to satisfy RPS obligations, a growing number of states are incorporating a "carve-out" or "set-aside" within the RPS stipulating that a portion of the renewable energy percentage or overall retail sales be derived from *solar* resources. For example, New Jersey, Maryland, and Delaware have each set aggressive targets for 2% of the state's electricity mix to be generated from solar resources, which together could result in more than 3,000 MW of solar capacity over the next 15 years. Eight other states and the District of Columbia have adopted solar or distributed generation set-asides as part of their RPS policies as well.[8]

Best practices for promoting solar through RPS policies involve:

- Establish an explicit solar set-aside in the RPS that ramps up over time.
- Develop a mechanism for tracking, verifying and trading solar renewable energy certificates (SRECs).
- Impose a monetary penalty or include an alternative compliance payment provision for electricity suppliers that do not meet solar generation requirements.
- Require long-term power-purchase or SREC contracts to ensure project developers can access financing.
- Encourage small-scale, distributed systems.

Colorado's Renewable Energy Standard exemplifies some of these key elements. For investor-owned utilities (IOUs), the requirement begins at 3% of retail electricity sales in 2007, rising incrementally to 20% by 2020. At least 4% of the renewable energy must be generated by solar-electric technologies and at least one-half of the solar share must be

[8] http://dsireusa.org/library/includes/type.cfm?EE=0&RE=1

generated by solar-electric systems located on-site at customers' facilities. SRECs are tradable. IOUs must offer a solar rebate of at least $2 per watt for systems up to 100 kW and can offer an up-front payment for SRECs. Utilities must develop standardized SREC contracts with a minimum term of 20 years. Electric cooperatives and municipal utilities are subject to a lower renewables standard, and there is no solar requirement. However, solar electricity generated by a facility that begins operation before July 1, 2015, receives 300% credit for RPS-compliance purposes.[9]

Municipalities that have authority over their local utilities may also choose to adopt RPS policies to promote renewable energy development. Cities leading the way in this regard include Columbia (MO), Austin (TX), and Fort Collins (CO). For example, the Austin City Council adopted a resolution for its municipal utility, Austin Energy, to meet 30% of all energy needs through the use of renewable resources by 2020, including at least 100 MW of solar power.[10]

Map of states with solar provisions in RPS policies:
http://www.dsireusa.org/documents/SummaryMaps/solar_DG%20RPS%20provisions.ppt

9 http://dsireusa.org/library/includes/incentivesearch.cfm?Incentive_Code=CO24R&Search=Type&type=RPS&CurrentPageID=2&EE=0&RE=1

10 http://dsireusa.org/library/includes/incentivesearch.cfm?Incentive_Code=TX11R&Search=Type&type=RPS&CurrentPageID=2&EE=0&RE=1

## FINANCIAL INCENTIVES

### Direct Incentives

*Description*

Direct incentives are used to 'buy down' the cost of solar systems and come in several forms including grants, rebates, and performance-based incentives. These incentives, typically covering 20% to 60% of project costs and ranging from a few hundred to millions of dollars, have played a significant role in encouraging solar installations. Rebates are typically disbursed to customers once the project is up and running and are typically awarded on a $/W basis. Performance-based incentives, on the other hand, provide project owners with cash payments based on electricity production on a $/kWh basis over a specified duration. Hybrid approaches – upfront rebates based on *expected* performance – have also been developed; these incentives are based on capacity ($/W) but take into consideration system rating, location, tilt and orientation, and shading to adjust the incentive. Payments based on performance or expected performance rather than capital investments are gaining prominence among program administrators as a way to maximize system design and installation.

*Providers*

The majority of direct incentives for solar projects are implemented at the state level and by publicly-owned utilities. However, there are examples of cities that provide direct incentives through municipally-owned utilities as well.

*Best Practices and Examples*

- Offer a generous incentive level with stable, long-term funding that decreases over time as the market matures. A good example is the California Solar Initiative – a 10-year, $3+ billion program that provides incentives for solar installations in all sectors. Incentive levels will automatically be reduced over the duration of the program in 10 steps based on the aggregate capacity of solar installed. In this way, incentive reductions are linked to levels of solar demand rather than an arbitrary timetable. [11]
- Establish a consistent but cost-effective quality-assurance mechanism to protect consumers and guarantee adequate system performance. Many state programs employ one or more of the following provisions: equipment requirements, design guidelines, pre-approved or certified installers, or incentives based on actual or expected performance.

[11] http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA134F&state=CA&CurrentPageID=1&RE=1&EE=1

- Create a feed-in tariff that supports solar at either the city or state level. Michigan Assemblywoman Kathleen Law introduced a bill in September 2007 that creates the first comprehensive renewable energy feed-in tariff (FIT) introduced into any U.S. legislature.[12]
- Incorporate an installer training and development strategy into incentive programs. The New York State Energy Research and Development Authority's (NYSERDA) efforts in solar workforce development are exemplary. NYSERDA provides numerous training and marketing assistance opportunities for solar installers and has invested nearly $1,000,000 in developing seven accredited solar training centers and continuing education programs across the state.[13]
- Consider offering higher incentive levels for high-value solar applications. Massachusetts, for example, gives a bonus incentive for systems incorporated into high-performance or "green" buildings and homes; systems that use components manufactured in-state; and installations for affordable housing developments or public buildings.[14] Wisconsin gives a higher incentive level for solar equipment installed by contractors with a specialized solar credential – certification by the North American Board of Certified Energy Practitioners (NABCEP).[15]
- Design an easy and concise application process.
- Allow flexibility for program modifications.
- Develop a coordinated package of policies to complement direct incentives, including net metering, low-interesting financing, and tax incentives.
- Foster utility support and cooperation to ensure a quick and easy grid-interconnection process for photovoltaic systems.
- Work with other state agencies and relevant stakeholder groups to educate the public about renewable energy technologies and to market the incentive program.
- Track the details of program use, costs, and energy savings/production to enable program evaluation and improvement.

12 http://www.renewableenergyaccess.com/rea/news/story;jsessionid=8608C1FA3F9BB6CEDE146D22360AD046?id=50004

13 http://text.nyserda.org/programs/Energy_Resources/photovoltaics.asp#training

14 http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=MA22F&state=MA&CurrentPageID=1&RE=1&EE=0

15 http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=WI14F&state=WI&CurrentPageID=1&RE=1&EE=0

## Low-Interest Loan Programs

*Description*

Low-interest financing for the purchase of solar energy equipment is a mechanism used to reduce the burden of high, up-front costs of solar equipment by providing consumers loans at a low interest rate. Repayment schedules vary and are usually determined on an individual project basis, but some offer a repayment term of up to 7-10 years.

*Providers*

States, utilities, and municipalities have used low interest loans to encourage the installation of solar energy equipment. This mechanism is used in about a dozen states primarily to support projects for the non-residential sector. Utility and local loan programs typically target the residential sector. Municipal or county programs may consider partnering with a local bank or community economic development organization to secure favorable terms or to structure interest rate buy-downs provided by the municipality.

*Best Practices and Examples*

- Aspen, Colorado's Community Office for Resource Efficiency (CORE), for example, has partnered with the Community Bank of Colorado to provide financing for photovoltaic or solar hot water systems. The typical loan term is five years and CORE pays the interest rate, resulting in a zero-interest loan for consumers.[16]
- The City of Ashland, Oregon's Conservation Division offers a solar water heating program to residential electric customers who currently use an electric water heater. Under "The Bright Way to Heat Water Program," qualified home owners may take advantage of the City's zero-interest loan program or a cash rebate. Customers choosing a loan repay it as part of their monthly utility bill. Interested customers are provided site evaluations, consumer education, information about available solar systems, and names of qualified contractors.[17]
- New Jersey's Clean Energy Program, administered through the New Jersey Board of Public Utilities, has offered local governments and schools a low-interest, long-term financing program to combine energy efficiency and renewable energy incentive programs. Financing under this program covered the entire incremental cost of energy efficiency and renewable energy projects, enabling the governmental entities to finance the projects completely, with no up-front capital necessary.[18]

[16] http://www.aspencore.org/sitepages/pid77.php

[17] http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=OR10F&state=OR&CurrentPageID=1&RE=1&EE=0

[18] http://www.njcleanenergy.com/

- Low-interest loans for renewable-energy systems are available to residential and small business customers of all Wisconsin Public Power, Inc. (WPPI) member utilities. This incentive is available for solar water-heating systems, solar space-heating systems for buildings that use electricity as the primary heat source, photovoltaic (PV) systems up to 20 kilowatts (kW) in capacity, wind-energy systems up to 20 kW in capacity, and repairs to existing systems. Customers can borrow from $2,500 to $20,000, at an interest rate of 1.99%. Loan terms vary from three to 10 years. Financing is through Fannie Mae's Residential Home Energy Improvement Program and underwritten by Energy Finance Solutions (EFS), a service of Wisconsin Energy Conservation Corporation. Eligibility is based on the customer's credit score, bankruptcy history and debt-to-income ratio.[19]

## Income/Investment Tax Credits

*Description*

Tax credits are directly deducted from the tax owed by the owner of the solar system. They typically range from 10% to 50% of project costs and can serve as an important driver to promote solar deployment in states where public benefits funds or other direct funding sources are not available.

*Providers*

More than a dozen states offer personal and/or corporate tax credits to help offset the expense of purchasing and installing solar energy equipment.

*Best Practices and Examples*

One of the weaknesses often attributed to tax incentive policies is that entities without a tax liability, such as government facilities, non-profits, and schools, are not eligible for the incentive despite their increasing interest in employing solar technologies. However, some states have developed provisions to extend tax credit benefits to non-taxed entities. Under Oregon's business energy tax credit "pass-through" option, for example, a project owner may transfer a tax credit to a pass-through partner in return for a lump-sum cash payment (the net present value of the tax credit) upon completion of the project.[20] This mechanism allows non-profit organizations, schools, governmental agencies, and other public entities and businesses with *or* without a tax liability to use the credit by transferring their tax credit to a partner with a tax liability.

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19 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=WI13F&state=WI&CurrentPageID=1&RE=1&EE=1

20 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=OR03F&state=OR&CurrentPageID=1&RE=1&EE=1

Arizona's solar tax credit allows a third-party company that finances and installs a solar energy system on a tax-exempt organization's facility to claim the credit, which results in lower overall project costs for the organization.[21] This type of arrangement in which a third party owns and operates a system on a public building and sells the electricity through a power-purchase agreement is gaining in popularity. Extending tax benefits to applications on public buildings can benefit municipalities seeking to install solar on their own facilities.

States have broadened tax credit programs in other ways to encourage a greater level of solar adoption. For example, while most tax credit programs target project owners, a few states, including Oregon, Utah, and Rhode Island, allow homebuilders who install solar energy systems to claim the credit in an effort to encourage the construction industry to integrate solar into new developments. Installing solar during building construction rather than as a retrofit improves the economics of such projects.

Although solar tax credits are typically state-level policies, municipal governments that impose income, franchise or other similar taxes can consider credits or exemptions to encourage solar adoption. New York City, for example, is considering offering a credit against its municipal income tax for commercial solar energy systems, as these projects are not eligible for the New York state solar tax credit.

## Property Tax Financing Districts

*Description*

While state and federal subsidies have made it more cost effective for many residential and commercial property owners to install solar electric and solar thermal systems, high up-front costs still present a barrier to more widespread solar adoption. Property tax financing for solar installations, as has been proposed by the City of Berkeley, could enable more property owners to install solar energy systems by allowing them to pay for the system through a long-term assessment on their property tax bill.

*Best Practices and Examples*

In November 2007, the Berkeley City Council approved a proposal by Mayor Tom Bates to make Berkeley the first city in the nation that would allow property owners (residential and commercial) to pay for energy efficiency improvements and solar system installations as a voluntary long-term assessment on their individual property tax bill. The City would provide the funding for the project from a bond or loan fund that it repays through assessments on participating property owners' tax bills for 20 years. The program is now in development, with a June 2008 target date for the launch of the pilot phase of the project.

[21] http://www.dsireusa.org/library/includes/map2.cfm?CurrentPageID=1&State=AZ&RE=1&EE=1

The Financing District would solve many of the financial hurdles facing property owners. First, there would be little upfront cost to the property owner. Second, the upfront costs would be repaid through a voluntary tax on the property, therefore funding approval would not determined directly by a property owner's credit or the equity in the property. Third, the total cost of the solar system and energy improvements would be comparable to financing through a traditional equity line or mortgage refinancing because the well-secured bond would provide lower interest rates than are commercially available. Fourth, the tax assessment would be transferable between owners. Therefore, if a property is sold prior to the end of the 20-year repayment period, the next owner would take over the assessment as part of their property tax bill.

## Property Tax Incentives

*Description*

Property tax incentives for solar installations typically follow a simple model that excludes the added value of solar energy equipment in the valuation of the property for taxation purposes.

*Providers*

States or local governments may impose property taxes and incentives to offset them.

*Best Practices and Examples*

Nearly half the states in the United States offer this incentive, but in some cases, such as New Hampshire, Virginia, and Colorado, state law allows local governments to provide exemptions from property taxation but does not require it.[22] In states where local governments have the authority to offer such exemptions, municipalities can use that authority to insulate residents and businesses that choose to install solar energy systems from higher property taxes.

## Sales Tax Incentives

*Description*

Sales tax incentives for solar projects, implemented in more than a dozen states, usually take the form of an exemption from the state sales tax for the cost of solar energy equipment.

[22] http://dsireusa.org/library/includes/type.cfm?EE=0&RE=1

*Providers*

Typically states provide for sales tax exemption, although some cities impose sales taxes as well.

*Best Practices and Examples*

In some states, the exemption is restricted to a particular sector, e.g., residential, or to systems that meet certain size requirements. Ideally, such exemptions would apply to all solar energy installations. As with property tax exemptions, local governments that have the authority to offer exemptions from local sales taxes may choose to offer this added benefit to residents and businesses that purchase and install solar energy systems.

## Expedited Permitting and Fee Waivers for Solar Projects

*Description*

Municipalities may consider other forms of assistance such as waiving building permits, plan check, or other fees consumers would normally face when installing a solar energy system. "Top-of-the-stack" or fast-track permitting, which often translates into savings, is another benefit local governments can provide to consumers or developers who install solar energy systems.

*Best Practices and Examples*

The City of Tucson, for example, will credit a building permit applicant for the permit fee up to a maximum of $1,000 for the installation of a qualifying solar energy system. The city allocated a total of $100,000 worth of credits for new buildings and an additional $100,000 worth of credits for existing buildings.[23] Marin County, California, in addition to offering a small rebate for solar energy systems, also waives design reviews for most solar installations for existing buildings if flush-mounted and offers over-the-counter permits for most solar installations on existing buildings.[24]

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23 http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=AZ26F&state=AZ&CurrentPageID=1&RE=1&EE=1

24 http://dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA08F&state=CA&CurrentPageID=1&RE=1&EE=1

## Industry Development Incentives

*Description*

Incentives can be used as a recruitment tool by cities and states to attract solar businesses to locate in a particular area. By providing these financial incentives, cities and states are able to attract the burgeoning solar industry to areas within the state where other forms of manufacturing may have once played a key role. This not only leads to job creation but also to positive public relations. Incentives can be used not only to promote the establishment or expansion of manufacturing operations, but also to support research, development and commercialization activities; partnerships with private venture capital funds to invest in clean energy companies; and business development activities for distributors and installers.

The most common industry incentives offered are loans, grants, tax abatements, tax credits, and tax exemptions, or a commitment by the state to purchase a set amount of the product. A number of states currently offer incentive-based programs for industry development (CA, CO, HI, MA, MI, MT, NC, NE, NM, NY, OR, TX, VA, WA, and WI). Many of the loan and grant programs are run through state-managed renewable energy funds, some of which are receiving funding through state legislative appropriations.

*Best Practices and Examples*

- CO's New Energy Economic Development (NEED) Fund: In 2007, the Colorado Legislature appropriated money to the Governor's Energy Office (GEO) from the limited gaming tax and the severance tax to establish and maintain the state's Clean Energy Fund. NEED, funded through the Clean Energy Fund, provides grants, loans and other financial incentives to attract manufacturers of renewable energy to the state. A total of $350,000 was available during the first funding round. The second round of funding, totaling about $650,000, will be available during the next competitive cycle with preference given to proposals that demonstrate the ability to provide matching funds.

- MA's Business Expansion Initiative: The Massachusetts Technology Collaborative (MTC), which administers the state's Renewable Energy Trust Fund, offers loans to support renewable energy companies entering or expanding the manufacturing stage of commercial development. Loan amounts range from $500,000 to $3,000,000, and are available for up to 50% of capital expenses and related spending over a two-year period.

- NY's Renewable, Clean Energy, and Energy Efficient Product Manufacturing and Incentive Program: Administered by the New York State Energy Research and Development Authority (NYSERDA) and funded through the New York System Benefits Charge (SBC), this incentive program goal is to increase the manufacturing of renewable, clean, and energy-efficient products in the state by

providing funds to manufacturers that wish to develop or expand facilities producing eligible products. The funding is provided in milestone phases with the limit of $1.5 million per project. Phase I provides money, up $75,000 with a cost share of 50% required, for facility and site characterization activities. Phase II covers pre-production development funding, no more than 20% of the total fund and up to a maximum of $300,000. This phase also requires a 50% cost share. Phase III is a production incentive payment based on the sale of clean energy products produced. The remaining 75% of total funding is available for this phase, subject to a 75% cost share and a total funding limit of $1.5 million per project.

## TECHNICAL TRAINING

### Training for Installers and Code Officials

*Description*

As markets develop within cities, the need for experienced solar installers becomes vital. Solar installers serve an essential role in ensuring quality and maintaining the legitimacy of cities' solar programs, particularly in nascent solar markets where the acceptance of solar is not necessarily prevalent. Even when using the finest equipment and system designs, solar energy systems can still fail if they are improperly installed. Equally important are qualified code inspectors that can ensure that all solar energy systems are installed in a safe manner.

*Providers*

Many different organizations may provide technical training if they have the expertise and facilities to provide it adequately. Training has been offered in the past by a variety of organizations including community colleges, non-profit organizations, universities, and trade organizations.

*Best Practices and Examples*

- The New York State Energy Research and Development Authority's (NYSERDA) efforts in solar workforce development are exemplary. NYSERDA provides numerous training and marketing assistance opportunities for solar installers and has invested nearly $1,000,000 in developing seven accredited solar training centers and continuing education programs across the state.[25]
- Codes and Standards are the backbone of the success of the Solar America Initiative (SAI). DOE selected New Mexico State University and its partners to lead a new Solar Codes and Standards Working Group. The Working Group will address code development and outreach activities in areas of critical importance to solar market penetration, such as interconnection procedures, net metering, product safety, and international standards coordination. This five-year effort will create a major improvement in the responsiveness, effectiveness, and accessibility of codes and standards to U.S. solar stakeholders at all levels, including cities.
- The North American Board of Certified Energy Practitioners (NABCEP) offers PV and solar thermal installer certification programs.[26]
- The Florida Solar Energy Center, the North Carolina Solar Center, and New Mexico State University have developed courses for installers and code officials to serve both state and national needs for training.[27]

[25] http://text.nyserda.org/programs/Energy_Resources/photovoltaics.asp#training
[26] http://www.nabcep.org/pv_installer.cfm
[27] http://www.fsec.ucf.edu/en/education/cont_ed/pv/igcpvs/installers.php, http://www.ncsc.ncsu.edu/, http://www.nmsu.edu/%7Etdi/Photovoltaics/Codes-Stds/Codes-Stds.html

# OUTREACH

## Outreach

*Description*

In order for solar energy to maximize its potential share of the energy market, the public must be educated on the benefits and challenges associated with its development and deployment. Solar outreach efforts can be tailored to target a number of audiences, including consumers (homeowners and businesses), utilities, financial institutions, educators and students, policy makers and regulators, skilled labor force, and potential retailers of solar technologies (e.g. big box retailers).

Lack of communication, information dissemination, and consumer awareness will limit solar's potential in our energy market. Outreach efforts in the form of media campaigns, education and training programs, and high-visibility events, competitions, and demonstration projects are just a few examples of outreach activities that can be implemented at the city level.

*Providers*

Potential providers of solar outreach include state and local governments, community organizations, colleges and universities, non-profit organizations, utilities, and industry associations.

*Best Practices and Examples*

A number of cities and states have solar outreach programs in place. These include:

- Portland, Oregon's *Solar Now!* campaign[28] is a one-year effort to grow demand for solar hot-water and photovoltaic systems. Within its first year, the project aims to get 100 systems installed in Portland in high-visibility locations and by high-visibility businesses and community members. The campaign is produced by the City of Portland Office of Sustainable Development in collaboration with Energy Trust of Oregon, Oregon Department of Energy, and Solar Oregon.
- In partnership with the Focus on Energy Program, WisconSUN[29] (Wisconsin's solar energy initiative) provides resources and programs uniquely designed to meet the needs of Wisconsin's solar energy community. As part of its marketing efforts, WisconSUN produces consumer-friendly information on solar energy systems specific to Wisconsin and easy access to the solar energy marketplace for site owners and consumers. Its Web site includes case studies and white papers on solar energy systems, links to funding sources, and links to dealers, installers, architects and engineers in the state.

[28] http://www.portlandonline.com/osd/index.cfm?c=43478&
[29] http://www.wisconsun.org/

- Pacific Gas & Electric's (PG&E) Solar Schools Program[30] is teaching the value of alternative energy by turning school buildings in California into hands-on science experiments. This award-winning program is making science fun and teaching students how their everyday actions can impact the environment. This year, PG&E will donate up to $2.5 million to support bright ideas grants, demonstration solar installations and training courses for teachers.

[30] http://www.pge.com/solarschools/